D. Atlantic Striped Bass

Introduction

The 36th SARC was asked to provide review and comment on a number of methodological aspects of the current striped bass assessment approach. The terms of reference included neither requests for stock status nor management advice. This part of the Advisory Report therefore differs from the previous sections and attempts to directly answer the Terms of Reference provided by the Atlantic States Marine Fisheries Commission.

1. Characterize the commercial and recreational catch including landings and discards.

Total catch in numbers including landings and discards dropped about 14%, from 5.04 million in 2000 to 4.3 million in 2001. While the 2000 total catch represented a series high, the 2001 catch is slightly above the 1996-2000 average of 3.9 million. Ages 4 to 7 represented 62% of the total catch, and ages 8+ represented 24%. The modal age is 5, consistent with that in 2000. The 1993-1997 year classes dominate, accounting for 12-18% of total catch. Although the proportion of 8 and older fish in the catch dropped to 15% in 2000 from 21% in 1999, it rose to a series high 24% in 2001.

Recreational fisheries accounted for 71% of the total 2001 catch, 46% of which was landings and 25% discards. New Jersey recreational fisheries accounted for 28% of total recreational landings, followed by MD (19%), VA (15%), MA (14%), and NY (9%). The remaining States each accounted for 4% or less of the total recreational landings. Commercial fisheries accounted for 29% of the total 2001 catch, 22% of which was landings and 7% was discards. Maryland commercial fisheries accounted for 57% of the total commercial landings, followed by VA (16%), PRFC (9%), and NY (6%). The remaining States each accounted for 4% or less of the total commercial landings.

Although total catch dropped considerably in 2001, total landings in numbers dropped less than 1% from 2.98 million fish in 2000 to 2.95 million in 2001. Landings by weight increased 8% to 25.8 million pounds, surpassing the previous high of 23.7 million pounds set in 2000.

Catch and Stock Status Summary (landings, discard, and SSB in metric tons, recruitment in millions of fish).

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Max[1]	Min[1]	Mean[1]
Commercial														
Landings	460	638	777	805	1,555	2,178	2,679	2,936	2,941	3,003	2,826	4,312	63	1,425
Discard	1,030	560	1,041	1,113	1,567	1,233	675	1,102	583	1,499	1,098	53	1,598	806
Recreational														
Catch	1,921	2,089	3,125	4,407	6,049	8,657	11,830	11,116	10,850	14,728	14,663	391	14,728	4,749
Total	3,411	3,287	4,943	6,325	9,171	12,069	15,184	15,155	14,375	19,231	18,588	773	19,231	6,369
SSB	20,976	23,365	27704	30,871	33,365	40,342	43,587	47,760	48,589	47,335	51,916	2,154	51,916	23,999
Recruitment	20.98	23.37	27.7	30.87	33.37	40.34	43.59	47.76	48.59	47.34	51.92	2.15	51.92	24
F age 4-10	0.1	0.08	0.11	0.12	0.18	0.18	0.23	0.21	0.22	0.24	0.23	0.05	0.41	0.17

[1] Based on 1982-2001 period.

2. **Review the VPA-based stock assessment and provide guidance on determining the best, most appropriate model configuration. Provide specific guidance on plus grouping, as well as an evaluation of the fishery independent surveys and the ages on which to base the last true age F.**

Age structure

Future assessments should review the selection of fully recruited ages for F estimation. Using age 5 striped bass as the first fully recruited age may not be appropriate. Proper assignment of the plus group should also be investigated. Creating a 12+ age group is an acceptable compromise, given that the 12+ group constitutes about 2% of the total harvest on average. Potential age misspecification is problematic, especially for older striped bass. The assessment should be re-run after the ageing issues are resolved. A calibration matrix that creates a conversion between scales and otoliths can be used to correct age misspecification from scale samples.

PR model

A flat-topped PR model specification is probably not appropriate. The data presented indicate that the dome-shaped PR is more suitable to Atlantic striped bass analysis. Specifically, catch on ages 4, 5 and 6, tagging information, and movement of large fish offshore, where there is little fishing activity, are evidence for a dome-shaped curve.

Tuning indices

An objective discrimination of which tuning indices to include or withhold from the model should be integrated in the next assessment. Candidate indices may be selected for inclusion by randomizing the series to see how each index performs. If parameter estimates and VPA diagnostics are significantly improved, then the index is a candidate for tuning the VPA. Indices should also be scrutinized for spatial and temporal compatibility with stock migration patterns. Statistical weights may be assigned *a priori* to candidate indices. Survey indices from the northern range of the stock may be characterizing the entire stock complex and should receive greater weighting in the VPA.

3. **Estimate fishing mortality rates for specific components of the coastal stock complex using tagging data.**

The tagging data are used to calculate maximum likelihood estimates of the multinomial parameters of survival and recovery based on an observed matrix of recaptures (using Program MARK). These methods are used to estimate fishing mortality rates for four mixed coastal stocks (Massachusetts, New York, Delaware Bay, and North Carolina). There should be some *a priori* deletion of models that do not have significant weight in the analysis. Deletion of some models may reduce the degree of uncertainty in the estimate. For example, the constant survival tagging model ought to be removed because it is biologically not reasonable, given documented changes in fishing effort.

4. **Discuss the validity of averaging stock specific estimates from several separate tagging programs as a means of estimating total stock exploitation.**

Tagging programs for specific coastal stocks operate during different time frames; the Massachusetts hook and line program and the New York ocean haul survey tag fish during fall, the New Jersey program tags fish during March and April, and the North Carolina winter trawl survey tags fish during January. Estimates from the Massachusetts program are generally low, and may reflect movement of tagged fish into the EEZ. Although it is desirable to get an overall estimate of fishing mortality of the coastal population, differences among tagging programs make averaging problematic.

5. **Review the discard-estimation methodology and the validity of using tag returns as an adjustment to the reporting rate.**

The discard estimation methodology is appropriate. However, error bars should be included around the estimators if it is ratio-based, or bootstrapping should be done if ratios are not used. Discard estimates use percentage mortality by gear; additional studies on discard mortalities by gear should be conducted to improve the quality of discard estimates.

6. **Provide a comparison of tag- and VPA-derived F estimates. If possible, provide guidance on the most comparable aspects of the VPA output and the tag-derived F. Also provide guidance on which of the tagging programs (or average of programs) would be most comparable to the VPA-derived F.**

VPA Fs weighted by N for ages 5-10 and average tag Fs from coastal tagging programs (only positive F values were included in the average) are compared in one of the documents presented and reviewed. Both estimates of fishing mortality show the same increasing trend over time. The VPA Fs tend to be slightly higher than the average coastal tag Fs, although the VPA estimate is not statistically different, based on 95% confidence intervals. The NC offshore winter tag program provided the closest comparison with the VPA results. Tagging estimates and VPA estimates should be incorporated into one assessment so that there is one result. Tagging estimates could be another parameter of the overall assessment.